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Osamu KIMOTO	Examiner: Menberu, Beniyam
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For: Color Image Communication Device and Color Image Communication Method	

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Dear Sir:

Enclosed herewith is a copy of the verified English translation of priority document Japanese Patent Application No. 2002-302521, filed October 17, 2002, from which priority is claimed under 35 U.S.C. § 119 and Rule 55.

Acknowledgment of the priority document(s) is respectfully requested to ensure that the subject information appears on the printed patent.

Respectfully submitted,
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STATEMENT OF VERIFICATION

I, Eri UNEO, of c/o Murata Machinery Ltd., 136 Takeda Mukaishiro-cho, Fushimi-ku, Kyoto-shi, Kyoto 612-8686 Japan, hereby declare that I am well acquainted with the Japanese and English languages, and that I am the translator of the documents attached, and certify that the following is a true English translation to the best of my knowledge and belief.

Dated this 5 day of December 2008

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[Name of Document] Specification 1

[Name of Document] Drawing 1

[Name of Document] Abstract 1

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[Necessity of proof] Necessary

[Document Name] Specification

[Title of the Invention] Color Image Communication Machine

[Scope of claims]

[Claim 1]

A color image communication machine arranged to be able to handle sYCC-JPEG, and to receive and process color image data that complies with a facsimile communication protocol and image data of a sYCC-JPEG color space, wherein

when received color image data is image data of the sYCC-JPEG color space, regardless of size information of the facsimile communication protocol, functional information that is attached to the image data of the sYCC-JPEG color space is prioritized, and the image data of the sYCC-JPEG color space is processed.

[Claim 2]

A color image communication machine arranged to be able to handle sYCC-JPEG, and to transmit color image data that complies with a facsimile communication protocol and image data of a sYCC-JPEG color space, wherein

when color image data to be transmitted is color image data that complies with the facsimile communication protocol, the color image data having size information of the facsimile communication protocol attached thereto is transmitted, and when the color image data to be transmitted is image data of the sYCC-JPEG color space, the image data of the sYCC-JPEG color space having functional information of the image data attached thereto is transmitted.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a color image communication machine that is used in a facsimile machine, a copy machine, and a multifunction peripheral of these machines, or the like.

[0002]

[Conventional Art]

Recently, a color facsimile machine that includes a color scanning device and transmits scanned color images via a telephone line is being developed. The color facsimile machine of this type transmits images in accordance with ITU-T Recommendation T.81. However, such a color facsimile machine can transmit only color image data of a predetermined size. Therefore, image data photographed through a digital camera cannot be transmitted via facsimile. In other words, since a data size of a data file of a digital camera or the like is designated purely by the number of pixels (the number of horizontal dots × the number of vertical dots), not by the number of pixels calculated from a printing size and resolution which are used in a conventional facsimile machine, such data cannot be transmitted.

[0003]

The image data photographed through a digital camera is generally expressed as JPEG image data of a standard (s) YCC color space (hereinafter referred to as the "sYCC-JPEG image data"). Meanwhile, it is defined in the ITU-T Recommendation T.81 that color image data is transmitted as JPEG image data of a LAB color space of

Computer-Integrated Enterprises (CIE) color system (hereinafter referred to as the "CIELAB-JPEG image data").

[0004]

Accordingly, the following technique is being proposed (for example, refer to patent document 1). That is, through such a technique, functional information (resolution, printable color number) of a printer of a transmission destination machine or of a transmission source machine is obtained so that high quality color image data of an image etc. photographed through a digital camera in particular can be forwarded to the transmission destination machine via a telephone line. Moreover, when the obtained resolution and printable color number of the printer is less than that of the transmission source machine or of the transmission destination machine, transmission image data is generated in accordance with a low resolution and printable color number.

[0005]

Further, the following technique is being proposed (for example, refer to patent document 2). That is, through such a technique, a facsimile machine is provided with a slot of a recording media used in a digital camera or the like. YCC-JPEG image data photographed through the digital camera or the like is once fetched from the recording media to a memory, and then expanded as RGB image data in the memory of the facsimile machine. Then, after white pixels are added such that a width of the image data corresponds to the prescribed number of pixels, the data is compressed again into LAB-JPEG image data, and sequentially transmitted in

accordance with the ITU-T Recommendation T.81.

[0006]

Furthermore, the following technique is being proposed (for example, refer to patent document 3). That is, such a technique provides a function of transmitting color information in a binary file transfer mode when communicating color information handled through a personal computer and color information handled through a digital camera, and a function of executing facsimile communication based on the ITU-T Recommendation T.81. Moreover, through such a technique, when a receiving machine does not have a receiving function of a binary file transfer mode, the color information is converted into facsimile information based on the ITU-T Recommendation T.81, and then transmitted. When the receiving machine has the receiving function of the binary file transfer mode, the color information is transmitted in the binary file transfer mode.

[0007]

[Patent document 1]

JP,2000-332933,A

[0008]

[Patent document 2]

JP,2001-285647,A

[0009]

[Patent document 3]

JP,2002-204361,A

[0010]

[Problems to be Solved by the Invention]

However, in the technique described in the above-identified patent document 1, the transmission image data is generated in accordance with the functional information included in the printer of the transmission destination machine or of the transmission source machine. Accordingly, not only a configuration becomes complicated due to such generation means, but also a cost increases. Moreover, when the resolution and the printable color number of the printer of the transmission destination machine or of the transmission source machine is less than that of the transmission source machine or of the transmission destination machine, the transmission image data is generated in accordance with a low resolution and printable color number. Therefore, it is not assumed that the image data photographed through the digital camera is directly transmitted.

[0011]

In the technique described in the above-identified patent document 2, the image data of a digital camera or the like is not directly transmitted from the facsimile machine. The recording media (such as a smart media) is inserted into the slot of the machine, the YCC-JPEG image data is converted into the RGB image data, the white pixels are added, and the data is further compressed into the LAB-JPEG image data and then transmitted, which thereby causes complication and increases a cost.

[0012]

In the technique described in the above-identified patent

document 3, when the receiving machine does not have the receiving function of the binary file transfer mode, the color information is converted into the facsimile information that is based on the ITU-T Recommendation T.81, and then transmitted. Accordingly, the image data of a digital camera or the like is not directly transmitted, which thereby causes complication due to the image conversion, and increases a cost.

[0013]

The present invention focuses on the above-described problems, and has as an object to provide a color image communication machine that can easily transmit/receive, at low cost, color image data photographed through a digital camera or the like, without performing conversion and compression, for example.

[0014]

[Means for Solving the Problems]

In order to achieve the above-described object, a color image communication machine described in claim 1 of the present invention can handle sYCC-JPEG, and receives and processes color image data that complies with a facsimile communication protocol and image data of a sYCC-JPEG color space, wherein when received image data is image data of the sYCC-JPEG color space, regardless of size information of the facsimile communication protocol, functional information attached to the image data of the sYCC-JPEG color space is prioritized, and the image data of the sYCC-JPEG color space is processed.

[0015]

In the present machine, when the image data of the sYCC-JPEG color space is received, regardless of the size information of the facsimile communication protocol, the functional information (information indicating an image of a digital camera) attached to the image data of the sYCC-JPEG color space is prioritized, and the image data of the sYCC-JPEG color space is processed (for example, stored in a memory). In other words, the image data of the sYCC-JPEG color space is tentatively received directly.

[0016]

A color image communication machine described in claim 2 can handle sYCC-JPEG, and transmits color image data that complies with a facsimile communication protocol and image data of a sYCC-JPEG color space, wherein when color image data to be transmitted is color image data that complies with the facsimile communication protocol, the color image data having size information of the facsimile communication protocol attached thereto is transmitted, and when the color image data to be transmitted is image data of the sYCC-JPEG color space, the image data of the sYCC-JPEG color space having functional information of the image data attached thereto is transmitted.

[0017]

In the present machine, when transmitting the image data of the sYCC-JPEG color space, the functional information (information indicating an image of a digital camera) of the image data is attached and then transmitted. In other words, the image data of the sYCC-JPEG color space is directly transmitted with the

functional information thereof attached thereto.

[0018]

According to the machine described in claims 1 and 2, since the color image data photographed through a digital camera or the like is directly transmitted/received, a configuration may be simplified compared to a case where conversion and/or compression or the like is performed as the conventional art, and moreover, the image data of the sYCC-JPEG color space can be easily transmitted/received at low cost.

[0019]

[Embodiment of the Invention]

The present invention will be described in more detail according to an embodiment.

[0020]

Fig. 1 is a block diagram illustrating an example of a configuration of a color image communication machine according to the embodiment. The color image communication machine is arranged as a multi functional peripheral that is used as both a copier and a facsimile machine.

[0021]

In Fig. 1, a Central Processing Unit (CPU) 1 as a main control unit includes a function of integrally controlling each unit that defines the machine.

[0022]

A Network Control Unit (NCU) 2, a MODEM 3, a ROM 4, a RAM 5, an image memory 6, a display unit 7, an operation unit 8, an image

scanning unit 9, an image recording unit 10, a Coder and Decoder (CODEC) 11, and a LAN I/F 12 are connected to the CPU 1 via a bus 13.

[0023]

The NCU 2 is controlled through the CPU 1, controls connection established with a Public Switched Telephone Network (PSTN) 14, which is a communication line, and includes functions of transmitting/receiving a dial pulse in accordance with a telephone number (including a facsimile number) of a communication destination. The MODEM 3 modulates transmission data and demodulates received data in accordance with V.17, V.27ter, V.29, or the like based on a facsimile transmission control protocol that complies with ITU-T Recommendation T. 30 and T.4, and can also be applied to a V. 34 FAX that uses V.8 and V.34. More specifically, the MODEM 3 modulates the transmission data, which normally is a digital signal, into an analog sound signal, transmits the data via the NCU 2 to the PSTN 14, and/or demodulates the analog sound signal received through the NCU 2 from the PSTN 14 into a digital signal.

[0024]

The ROM 4 is arranged to store programs etc. used to control operations of the entire machine. The RAM 5 stores data that is necessary for the control performed by the CPU 1 and data that is required to be temporarily stored at the time of the controlling operation. The image memory 6 is arranged to store, in a compressed state, the image data scanned through the image scanning unit 9,

and also store, in a compressed state, the image data received from outside via the PSTN 14 and the MODEM 3.

[0025]

The display unit 7 is arranged to display icons, key buttons, messages that are necessary for data transmission/reception, and telephone number and FAX number that are input in an operation of the operation unit 8. A CRT display and a Liquid Crystal Display (LCD) etc. are used as the display unit 7. The operation unit 8 is arranged to include a numeric keypad used to input telephone number and FAX number, one-touch keys used to call up the telephone number and FAX number of the destination by one-touch, registration keys used to register abbreviated telephone number and FAX number of the destination, a start key used to instruct to start facsimile or copying, an operation mode switching key used to switch modes among a plurality of operation modes such as a FAX mode, a copy mode, and a scanner mode etc., or the like.

[0026]

The image scanning unit 9 is arranged to optically scan image data of an original document when performing facsimile transmission or copying. The image scanning unit 9 can scan color images. The image recording unit 10 includes an electrophotographic printer, and records on a recording paper, the received image data and the image data of the original document that is scanned through the image scanning unit 9 in the copying operation. The image recording unit 10 is capable of color printing.

[0027]

The CODEC 11 is arranged to perform encoding by using an MH, MR, or MMR method in order to transmit or store the scanned image data, and perform decoding in order to record the received image data through the image recording unit 10. The LAN I/F 12 is connected with a PC and an external device that constitutes another Local Area Network (LAN) 15. Data is transmitted to and received from the external device via the LAN I/F 12.

[0028]

Next, a color image data transmitting operation performed through the color image communication machine will be described with reference to a flow chart of Fig. 2. First, a FAX number of a destination (called end) is dialed in step ST1. Then, it is determined in step ST2 whether or not there is a response from a machine of the called end. When there is no response, it is determined in step ST8 whether or not preset time T0 has elapsed. When the time T0 elapses, a redialing process is performed in step ST10, i.e., the process returns to step ST1. When the time T0 does not elapse, a Calling Tone (CNG) signal is transmitted in step ST9, and the process returns to step ST2.

[0029]

When there is a response from the machine of the called end in ST2, a signal is received from the destination in step ST3. Then, in step ST4, it is determined whether or not the received signal is a Digital Identification Signal (DIS). When the received signal is not a DIS signal, the process returns to step ST2.

[0030]

When the received signal is a DIS signal, it is determined in step ST5 whether or not an original document (image) to be transmitted is color image data. When it is determined that the image to be transmitted is color image data, it is further determined in step ST6 whether the color image data is CIELAB-JPEG image data or sYCC-JPEG image data. In the case of sYCC-JPEG image data, the sYCC-JPEG image data is transmitted without setting document size information (such as main scanning width, sub scanning line density, and resolution) of a Digital Command Signal (DCS) in step ST7.

[0031]

Meanwhile, when it is determined in ST5 that the original document is not color image data, in other words, when it is determined that the original document is monochrome image data, the process proceeds to step ST11. When it is determined in step ST6 that the color image data is CIELAB-JPEG image data, since the CIELAB-JPEG image data complies with the ITU-T Recommendation T.81, the process proceeds to step ST11. In step ST11, the transmission is performed in a conventional facsimile communication protocol.

[0032]

Next, a color image data receiving operation performed through the color image communication machine will be described with reference to a flow chart of Fig. 3. First, in step ST21, when a CNG signal is received from the machine of a calling end, a DIS signal is output to the machine of the calling end. Then, in step ST22, it is determined whether or not the signal received from the machine of the calling end is a DCS signal. When the received signal

is not a DCS signal, the process proceeds to step ST21, and a DIS signal is transmitted again.

[0033]

When the received signal is a DCS signal, it is determined in step ST23 whether or not an original document (image) to be received is color image data. When the image to be received is color image data, it is further determined in step ST24 whether the color image data is CIELAB-JPEG image data or sYCC-JPEG image data. In the case of sYCC-JPEG image data, in step ST25, original document size information of the DCS signal is disregarded, and the sYCC-JPEG image data is received.

[0034]

Meanwhile, when it is determined in step ST23 that the original document is not color image data, in other words, when it is determined that the original document is monochrome image data, the process proceeds to step ST26. In step ST24, when the color image data is CIELAB-JPEG image data, since the CIELAB-JPEG image data complies with the ITU-T Recommendation T.81, the process proceeds to step ST26. In step ST26, the reception is performed in accordance with the conventional facsimile communication protocol.

[0035]

[Advantages of the Invention]

As described above, according to the present invention, the color image data photographed through a digital camera or the like is directly transmitted/received. Accordingly, a configuration can

be simple compared to a case where conversion or compression etc. is performed as the conventional art, and the image data of the sYCC-JPEG color space can be easily transmitted/received at low cost.

[Brief Description of the Drawings]

[Fig. 1]

Fig. 1 is a block diagram illustrating an example of a configuration of a color image communication machine (i.e., a multi functional peripheral that is used as both a copier and a facsimile machine) according to an embodiment.

[Fig. 2]

Fig. 2 is a flow chart illustrating a color image data transmitting operation performed through the color image communication machine.

[Fig. 3]

Fig. 3 is a flow chart illustrating a color image data receiving operation performed through the color image communication machine.

[Description of the Reference Numerals]

1 Main control unit (CPU)

2 NCU

3 MODEM

4 ROM

5 RAM

6 Image memory

7 Display unit

8 Operation unit

9 Image scanning unit

10 Image recording unit

11 CODEC

12 LAN I/F

13 Bus

14 PSTN

15 LAN

FIG. 1

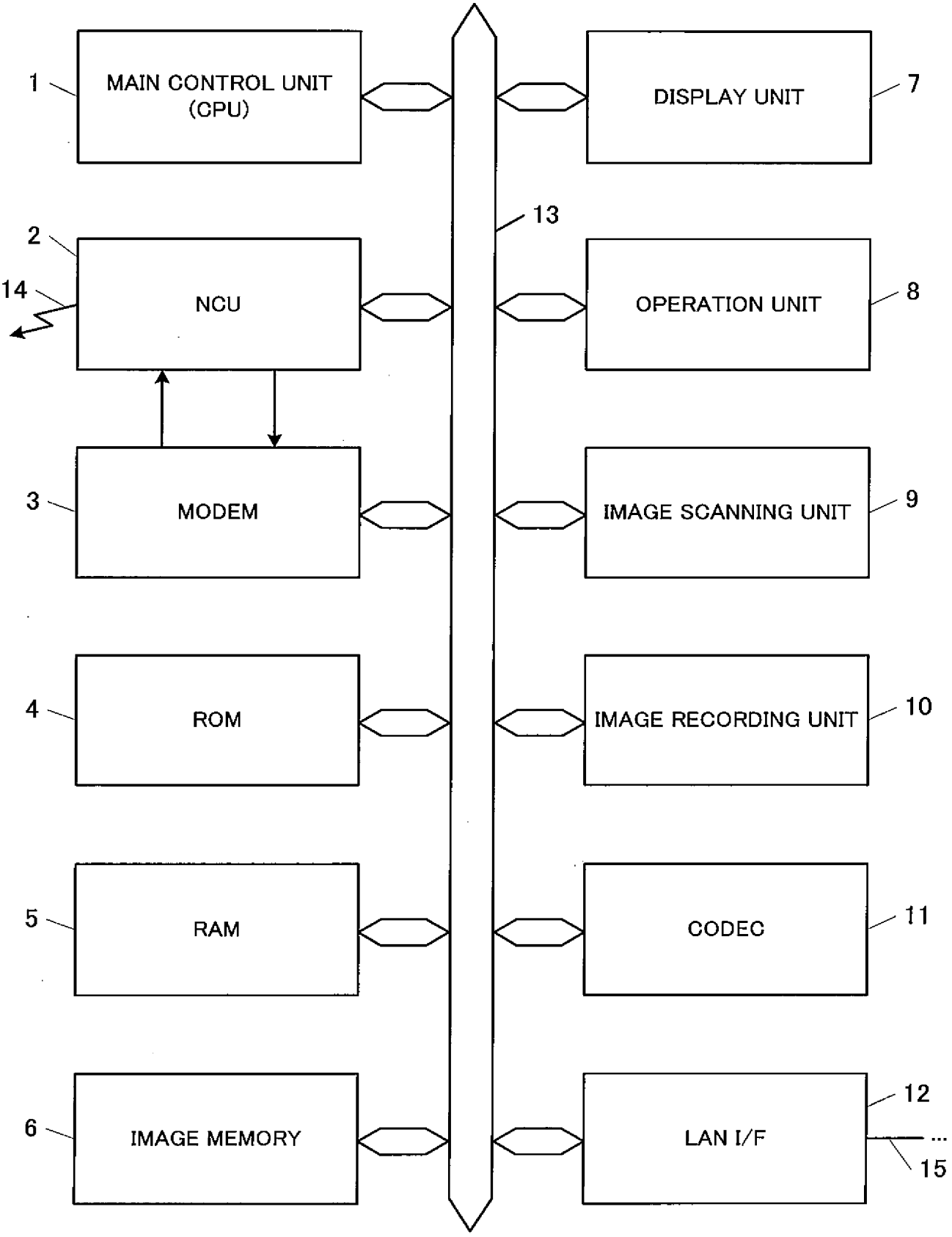

1
MAIN CONTROL UNIT (CPU)
DISPLAY UNIT
7
13
2
14
NCU
OPERATION UNIT
8
3
MODEM
IMAGE SCANNING UNIT
9
4
ROM
IMAGE RECORDING UNIT
10
5
RAM
CODEC
11
6
IMAGE MEMORY
LAN I/F
12
15

FIG. 2

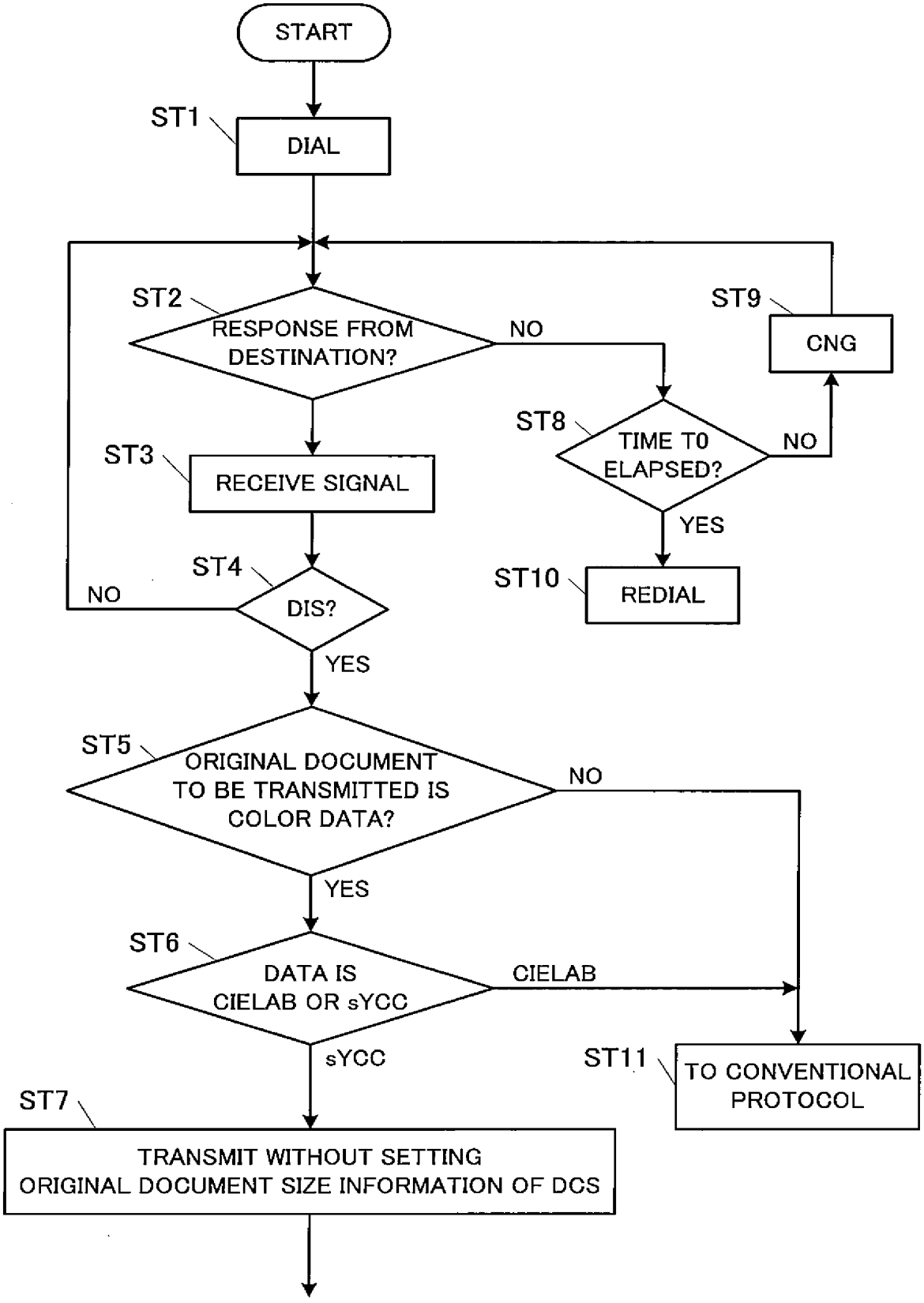
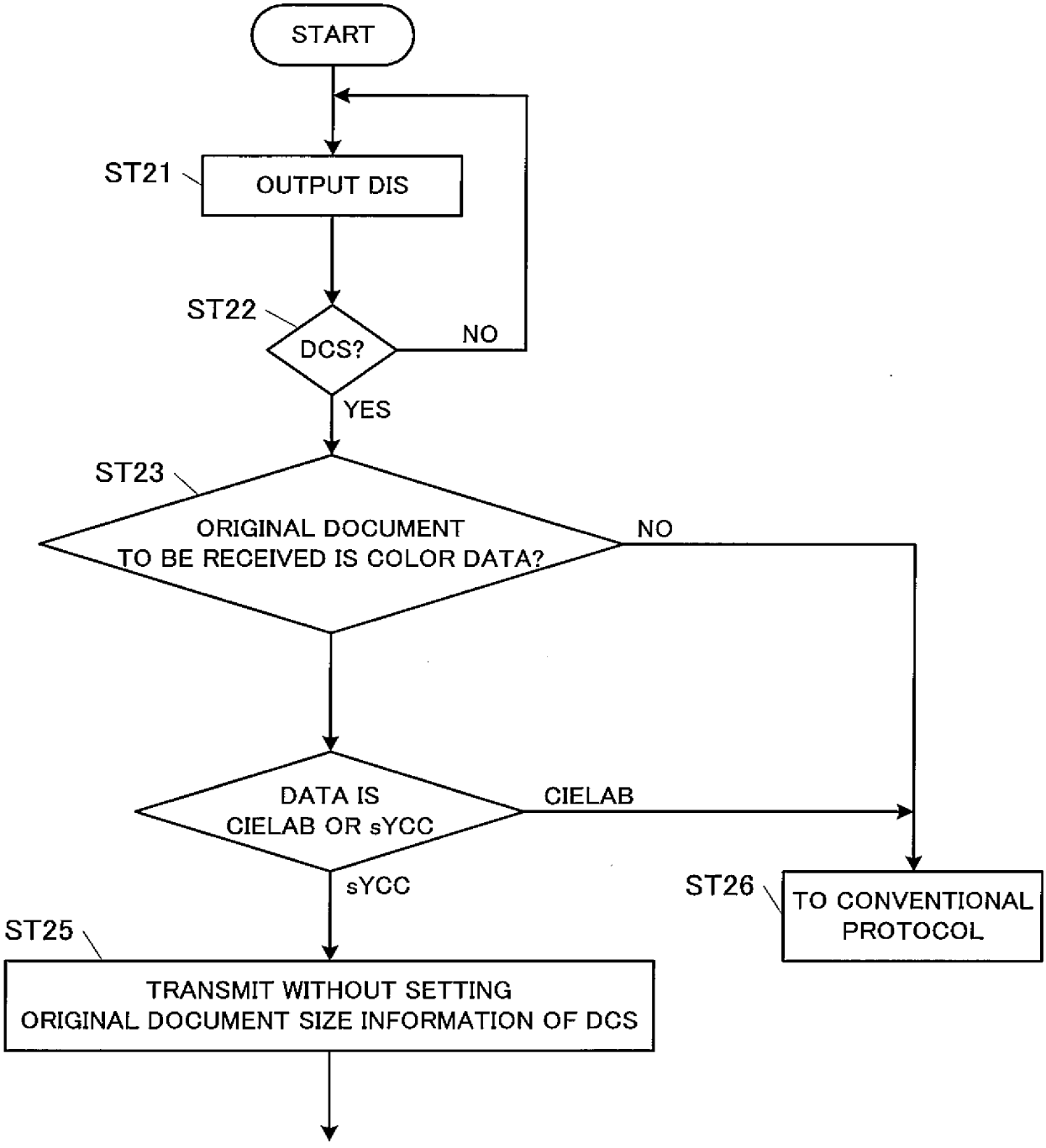

START
ST1
DIAL
ST2
RESPONSE FROM DESTINATION?
NO
ST9
CNG
ST8
TIME T0 ELAPSED?
NO
YES
ST3
RECEIVE SIGNAL
ST4
DIS?
NO
ST10
REDIAL
YES
ST5
ORIGINAL DOCUMENT TO BE TRANSMITTED IS COLOR DATA?
NO
YES
ST6
DATA IS CIELAB OR sYCC
CIELAB
sYCC
ST11
TO CONVENTIONAL PROTOCOL
ST7
TRANSMIT WITHOUT SETTING ORIGINAL DOCUMENT SIZE INFORMATION OF DCS

FIG. 3


START
ST21
OUTPUT DIS
ST22
DCS?
NO
YES
ST23
ORIGINAL DOCUMENT
TO BE RECEIVED IS COLOR DATA?
NO
DATA IS
CIELAB OR sYCC
CIELAB
sYCC
ST26
TO CONVENTIONAL
PROTOCOL
ST25
TRANSMIT WITHOUT SETTING
ORIGINAL DOCUMENT SIZE INFORMATION OF DCS

[Document Name] Abstract

[Abstract]

[Object] A color image communication machine is provided which can easily transmit/receive, at low cost, color image data photographed through a digital camera or the like without performing conversion or compression etc.

[Means for Solving the Problem] When transmitting image data, dialing is performed (ST1), it is determined whether or not there is a response from a destination (called end) (ST2), when there is a response, a signal is received from the called end (ST3), and it is determined whether or not the received signal is a DIS signal (ST4). When it is determined that the received signal is a DIS signal, it is determined whether or not an original document (image) to be transmitted is color image data (ST5). When the image is color image data, it is determined whether the color image data is CIELAB or sYCC (ST6). In the case of sYCC, the data is transmitted without setting original document size information of a DCS signal (ST7). When it is determined that the original document is not color image data or that the color image data is CIELAB, the transmission is performed in accordance with a conventional facsimile communication protocol.

[Selected Drawing] Fig. 2